Identifying and evaluating eight extension functions and implications for policy, planning and evaluation

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Abstract

Purpose: This paper reports how different extension roles and their functions – or contributions - were identified within an agricultural innovation system to inform their evaluation.
Methodology and findings: This study co-developed eight extension functions and evaluation measures through case studies of teams working to reduce agricultural pollutants entering the World Heritage-listed Great Barrier Reef, off the North East Australian Coast.
Practical implications/value: This provides a practical approach for effectively evaluating a range of extension functions in agricultural innovation systems.
Theoretical implications: Develops a full set of extension roles, contributions and measures for evaluating impact of several extension functions within agricultural innovation systems.

Introduction

Extension is often perceived as working directly with landholders to achieve practice change. Viewing extension through this narrow lens undervalues the other ways extension contributes to the change process. It also limits effective evaluation of extension intervention in complex agricultural innovation systems, where the different, but complementary, roles of extension intervention need to be considered when evaluating the overall performance of agricultural innovation programs (Douthwaite and Hoffecker, 2017).

Diffuse-source pollutants (nutrient, fine sediment and pesticide) from agriculture is a threat to the health and resilience of the Great Barrier Reef (GBR) (Waterhouse et al., 2017). To address this, the Australian and Queensland Government's established the Reef 2050 Water Quality Improvement Plan (Reef WQIP) with defined best practice land management and water quality targets (State of Queensland, 2018). The Department of Agriculture and Fisheries (DAF) is funded to deliver extension to facilitate landholder adoption of practices that reduce pollutant loss from agricultural lands. Other agricultural industry groups, private consultants and natural resource management bodies are also funded to deliver extension and on-ground works under the Reef WQIP. The government has adopted an evaluation system that models the water quality response from adoption of land management practices and where those changes have been made (i.e., climatic conditions, soil types) (State of Queensland, 2017).

In mid-2019, the DAF GBR governance group recognised that several functions performed by their project teams are difficult to evaluate through these measures. Government extension has a clear role around market failure and public good (Rivera and Qamar, 2003). Water Quality as it affects the GBR, is public good. Based on this premise, government extension focuses on gaps and new opportunities where industry and private extension are not working, or not filling the need. A study was commissioned to identify the functions of government extension teams and evaluation performance indicators and measures.

A comprehensive framework was developed (Coutts et al., 2020) for identifying key roles performed by DAF extension. Eight distinct *Contribution Categories* were identified for extension within the complex system funded to achieve the targets of the Reef WQIP. These encompassed working with producers, through to building capacity of service providers, collaboration and informing policy and investment. These contribution categories formed the basis for identifying indicators and methods for evaluation, to capture the incremental steps to adoption and the synergistic influence of multiple extension providers. This paper describes the process used in the evaluation using two case studies of different contribution categories: (1) developing private sector extension capacity in the sugar industry; and (2) contributing to policy development in the pineapple industry.

Methodology

The Synergy Matrix (Coutts, 2021) was used to determine the specific Contribution Category/ies which each DAF extension team was engaging in. Key Evaluation Questions were: (1) what intervention is needed within the innovation system to maximise the required outcomes; (2) what role is the extension project playing in the system; and (3) how effectively is it fulfilling this role? This process also identifies gaps and what other roles need to be addressed, perhaps by other players. Impact pathways (Douthwaite et. al., 2003) a type of flow diagram, were developed in conjunction with project teams to map how the project's key roles contribute to the Reef WQIP targets. They outlined how the project would have an impact through incremental steps towards the best practice and water quality targets. This provided a basis for identifying performance indicators for impact evaluation. Data collection is based on the appropriate Contribution Categories and related impact pathways.

Results

Case 1: Developing private sector extension capacity in the sugar industry

The synergy matrix identified DAF had a niche role in providing training and technical support to other extension staff in the sugar industry, in relation to the pesticide management innovation system. The impact pathway for this contribution category (service provider capacity (CC2)) identified how the project would support service capacity to increase precision application and pesticide selection decisions, leading to wider adoption and ultimately increased area of land using precision pesticide application with less run-off. From this, performance indicators were identified as; number of service providers engaged; and their area of influence. The subsequent evaluation involved surveying service providers and concluded that DAF extension increased service providers' understanding of pesticide chemical management, and half reported modifying their advice to their broader grower clients, thereby increasing the impact of this work.

Case 2: Contributing to policy development in the pineapple industry

The synergy matrix identified DAF as having key roles in conducting trials assessing the water quality impacts of new practices and using this information to establish best practice frameworks for the pineapple industry. The impact pathway for this contribution category (contribution to policy (CC6)) illustrates how the project contributes to validating new practices, leading to new or modified practices becoming commercially viable, hence wider adoption with improved water quality outcomes. Performance indicators were; the extent to which practice modifications improve water quality; and evidence of changes made to policy or programs because of the project.

Discussion and conclusions

Through working with extension teams to develop synergy matrices and impact pathways for each extension project, the research established and trialled a robust evaluation framework, complimenting the existing evaluation system (Coutts et al., 2020). The framework, comprising the eight contribution categories, synergy matrices and impact pathways, was shown to be valuable for identifying and developing performance indicators to evaluate the contribution of an extension project to achieving change within an agricultural innovation system. The synergy matrix highlighted niche roles of individual extension projects and the contribution of different extension projects to achieving collective outcomes within a complex innovation system. The impact pathway showed a clear relationship between the project contributions and the Reef WQIP targets. The framework has been used to evaluate and report outcomes of DAF extension projects, ensuring the project's actual impact could be properly evaluated and reported. Furthermore, the contribution categories have been integrated into project planning and reporting and used to communicate the role of DAF extension.

Although there continues to be a focus on reporting best practice adoption as it directly relates to the Reef WQIP targets, this framework enhances awareness of the different extension roles needed to facilitate lasting change and the niche role of DAF extension within agricultural innovation systems. This could provide better information to demonstrate efficiency and effectiveness of extension projects; reduce duplication and competition for reporting adoption by demonstrating the synergistic contribution of multiple extension projects to practice change; and assist in more strategic planning of future investment to provide the necessary conditions for long-term sustainable on-ground change. This framework has relevance at policy, program and project levels within the complex innovation system that operates to improve water quality entering the GBR. It has broader application for evaluating complex agricultural change programs in other contexts.

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